Application No. : 10/721,607
Preliminary Amdt. Dated : November 4, 2005

Amendments To The Claims

The listing of claims replaces all prior versions and listings of claims. Only those claims being amended herein show their changes in highlighted form, where insertions appear as underlined text (e.g., insertions) while deletions appear as strikethrough text (e.g., ~~deletions~~).

1. (Original) A probe-off detector providing an indication that a physiological sensor may not be properly positioned proximate a tissue site, said probe-off detector comprising:

a signal quality input that defines an acceptable operating region for the sensor;

a signal strength calculator comprising an input in communications with a sensor signal from a sensor; and

a signal strength output dependent on a time-varying component of the sensor signal; a stored relationship between the signal strength output and the signal quality input; and probe-off logic providing a probe-off output based on a comparison of the signal strength output and the signal quality input with said stored relationship.

2. (Original) The probe-off detector of claim 1, wherein the probe-off logic comprises a comparator.

3. (Original) The probe-off detector of claim 1, wherein the probe-off logic comprises an energy ratio check.

4. (Original) The probe-off detector of claim 1, wherein the probe-off logic comprises a time check indicating that no acceptable pulses have occurred for a sufficient time period.

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5. (Original) A method of detecting that a pulse oximetry sensor may not be properly attached to a tissue site by processing a sensor signal, the method comprising:

determining a signal strength limit dependent on a processor input;

calculating a signal strength value from a sensor signal of a pulse oximetry sensor;

calculating a signal quality value of the sensor signal; and

indicating a probe-off condition when the signal strength value is below the signal strength limit for the signal quality value.

6. (Original) The method of claim 5, wherein the processor input comprises a sensitivity mode.

7. (Original) A detector for determining when a physiological sensor may not be properly positioned with respect to a measurement site, the detector comprising a signal strength calculator which processes an input signal expected to be representative of at least one parameter measured by a physiological sensor, to produce an output representative of a strength of the input signal; and logic which indicates that the input signal may not represent the parameter when a predetermined portion of the output is below a threshold value.

8. (Original) The detector of claim 7, wherein the threshold value comprises a floor value below which a probe-off condition exists for all values of the output.

9. (Original) A method of determining whether a pulse oximetry sensor is properly connected to a patient, said method comprising the steps of:

receiving a signal strength vector;

receiving at least one of a signal strength limit and a pulse rate density;

providing an indication of poor signal strength based on said signal strength vector and said at least one of a signal strength limit and a pulse rate density; and

determining whether a pulse oximetry sensor is properly connected to a patient based at least in part on the indication.

10. (Original) The method of claim 9, wherein said at least one of said signal strength limit and said pulse rate density includes said signal strength limit, and wherein said providing the indication further comprises determining a relationship between a signal strength scalar and said signal strength limit, wherein said signal strength scalar is based upon said signal strength vector.

11. (Original) The method of claim 10, wherein said determining a relationship between a signal strength scalar and said signal strength limit comprises determining whether said signal strength scalar is greater than or equal to said signal strength limit.

12. (Original) The method of claim 9, wherein said at least one of said signal strength limit and said pulse rate density includes said pulse rate density, and wherein said providing the indication further comprises determining a relationship between a signal strength scalar and said pulse rate density, wherein said signal strength scalar is based upon said signal strength vector.

13. (Original) The method of claim 12, wherein said determining a relationship between a signal strength scalar and said pulse rate density comprises determining whether said pulse rate density is greater than a function of said signal strength scalar.

14. (Original) The method of claim 13, wherein said function is of the form y=mx+b and wherein b comprises said signal strength scalar.

15. (Original) The method of claim 14, wherein m is approximately -0.1.30.

16. (Original) The method of claim 14, wherein b is approximately 0.53.

17. (Original) The method of claim 9, further comprising providing an indication of signal strength failure based on said signal strength vector and said at least one of a signal strength limit and a pulse rate density; and wherein said determining further comprises determining whether the pulse oximetry sensor is properly connected to the patient based on at least one of the indication of poor signal strength and the indication of signal strength failure.

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18. (Original) The method of claim 17, wherein said providing the indication of signal strength failure further comprises determining a relationship between a signal strength scalar and a floor value, wherein said signal strength scalar is based upon said signal strength vector.

19. (Original) The method of claim 18, wherein said determining a relationship comprises determining whether said signal strength scalar is greater than or equal to said floor value.

20. (Original) The method of claim 19, wherein said floor value is approximately 0.02.

21. (New) A method of determining a sensor off condition for physiological monitoring system, comprising:

receiving first and second intensity signals from a light-sensitive detector in the sensor which detects light of at least first and second wavelengths attenuated by body tissue carrying pulsing blood;

determining a plurality of signal characteristics of the first and second intensity signals origination from the sensor; and

analyzing the plurality of signal characteristics to determine the sensor off condition.

22. (New) The method of Claim 21, wherein said analyzing comprises a rules based evaluation of the plurality of signal characteristics.

23. (New) The method of Claim 22, wherein said plurality of signal characteristics comprises at least two of energy ratio, signal strength, pulse rate density, and a counter of the number of portions of the first or second intensity signal that contain no acceptable pulse data.

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